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November 20, 1862.

Major-General SABINE, President, in the Chair.

In accordance with the Statutes, notice of the ensuing Anniversary Meeting for the election of Council and Officers was given from the Chair.

Mr. Gassiot, Dr. Hooker, Prof. Clerk Maxwell, Prof. Sylvester, and the Rev. R. Willis, having been nominated by the President, were elected by ballot Auditors of the Treasurer's Accounts on the part of the Society.

Captain Charles Frederick Alexander Shadwell, R.N., and Mr. Balfour Stewart were admitted into the Society.

Pursuant to notice given at the last Meeting, The Right Honourable James, Earl of Caithness, was proposed for election and immediate ballot; and the ballot having been taken, His Lordship was declared duly elected.

The following communications were read :—

- I. "On the Synthesis of Tribasic Acids." By MAXWELL SIMPSON, M.B., F.R.S. (See p. 236.)
- II. "Notice of Remarkable Hailstones which fell at Headingley on the 7th of May, 1862." By THOMAS SUTCLIFFE, Esq. (See p. 239.)
- III. "On the true Theory of Pressure as applied to Elastic Fluids." By R. MOON, M.A. (See p. 242.)
- IV. "On the Nerves of the Liver, Biliary Ducts, and Gall-bladder." By ROBERT LEE, M.D., F.R.S. (See p. 246.)
- V. "On the Volumes of Pedal Surfaces." By T. A. HIRST, F.R.S. (See p. 247.)
- VI. "On the Causes of various Phenomena of Attraction and Adhesion, as exhibited in Solid Bodies, Films, Vesicles, Liquid Globules, and Blood-Corpuscles." By RICHARD NORRIS, Esq. (See p. 251.)

VII. "On Stasis of the Blood, and Exudation." By RICHARD NORRIS, Esq. (See p. 258.)

VIII. "On the Theory of Parallels." By Lieut.-General T. PER-
RONET THOMPSON, F.R.S. (See p. 268.)

IX. "On the Fossil Remains of a long-tailed Bird (*Archeopteryx
macrurus*, Ow.) from the Lithographic Slate of Solenhofen."
By Prof. RICHARD OWEN, F.R.S. Received November 6,
1862.

(Abstract.)

The author details the circumstances connected with the discovery of the fossil remains, with the impressions of feathers, in the Lithographic slates of Solenhofen, of the Oxfordian or Corallian stage of the Oolitic period, and of the acquisition for the British Museum of the specimen which forms the subject of his paper.

The exposed parts of the skeleton are,—the lower portion of the furculum; part of the left os innominatum; nineteen caudal vertebræ in a consecutive series; several ribs, or portions of ribs; the two scapulæ, humeri, and antibrachial bones; parts of the carpus and metacarpus, with two unguiculate phalanges, probably belonging to the right wing; both femora and tibiæ, and the bones of the right foot. Impressions of the quill-feathers radiating fan-wise from each carpus, and diverging in pairs from each side of the long and slender tail. The above parts indicate the size of the winged and feathered creature to have been about that of a rook. The several bones, with their impressions and those of the feathers, are described, and the bones are compared with their homologues in different Birds and in Pterodactyles. Whence it appears that, with the exception of the caudal region of the vertebral column, and apparently of a bi-unguiculate manus, with less confluent condition of the metacarpus, the preserved parts of the skeleton of the feathered animal accord with the ornithic modifications of the vertebrate skeleton. The main departure therefrom is in a part of that skeleton most subject to variety. Twenty caudal vertebræ extend from the sacrum in a consecutive and naturally articulated series, resembling in structure and proportions those of a squirrel. The tail-feathers are in pairs corresponding in number with the vertebræ, diverging therefrom at an angle of 45° backward, becoming more acute near the end, and the last pair extending nearly

parallel with and $3\frac{1}{2}$ inches beyond the last caudal vertebra. This feathered tail is 11 inches long and $3\frac{1}{2}$ inches broad, with an obtusely rounded end. This novel and unexpected character of the tail is owing to the constancy with which all known existing and tertiary birds have presented the short bony tail with the terminal modification in most of them of the ploughshare bone.

Professor Owen next gives the results of investigations into the osteogeny of embryo-birds, showing the number of vertebræ corresponding to the anterior caudals in *Archeopteryx* which coalesce with the pelvis in the course of growth, and the degree to which the posterior caudals retain a resemblance to those of *Archeopteryx* in the Birds with rudimental wings. From eighteen to twenty caudal vertebræ may be counted in the young Ostrich. In *Archeopteryx* the embryonal separation persists with such continued growth of the individual caudal vertebræ as is commonly seen in long-tailed Vertebrates, whether Reptilian or Mammalian. The author remarks that the modification and specialization of the terminal bones of the spinal column in modern birds is closely analogous to that which converts the long, slender, many-jointed tail of the modern embryo-fish into that short and deep symmetrical shape, with coalescence of terminal vertebræ into a compressed lamelliform bone, like the 'os en charrue' of birds, to which the term 'homocercal' applies; such extreme development and transformation usually passing through the heterocercal stage, at which, in palæozoic and many mesozoic fishes, it was arrested. Thus he discerns in the main differential character of the mesozoic bird a retention of structure which is embryonal and transitory in the modern representatives of the class, and consequently a closer adhesion to the general vertebrate type.

The least equivocal parts of the present fossil declare it to be a Bird, with rare peculiarities indicative of a distinct order in that class. Although the head is absent, the author predicts, by the law of correlation, a beak-shaped mouth for the preening of the plumage; and he also infers a broad and keeled sternum in correlation with the remains of feathered organs of flight.

The paper is accompanied by drawings of the fossil and its parts, and of homologous parts in Birds and Pterodactyles. The author assigns to the fossil animal the name of *Archeopteryx macrurus*.